OCR

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Monday 10 November 2014 – Morning

GCSE METHODS IN MATHEMATICS

B391/02 Methods in Mathematics 1 (Higher Tier)

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Candidates answer on the Question Paper.

OCR supplied materials:
None

Other materials required:
- Geometrical instruments
- Tracing paper (optional)

Duration: 1 hour 15 minutes

B391 02

Candidate forename		Candidate surname	

Centre number						Candidate number				

INSTRUCTIONS TO CANDIDATES

- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. HB pencil may be used for graphs and diagrams only.
- Answer **all** the questions.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Your answers should be supported with appropriate working. Marks may be given for a correct method even if the answer is incorrect.
- Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).
- Do **not** write in the bar codes.

INFORMATION FOR CANDIDATES

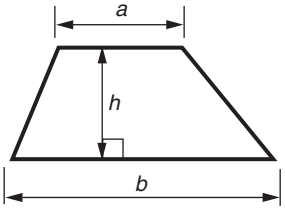
- The number of marks is given in brackets **[ ]** at the end of each question or part question.
- Your quality of written communication is assessed in questions marked with an asterisk (*).
- The total number of marks for this paper is **60**.
- This document consists of **12** pages. Any blank pages are indicated.

WARNING

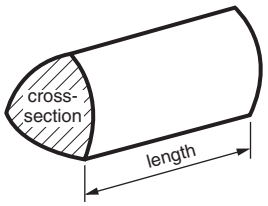
No calculator can be used for this paper

Formula Sheet

Area of trapezium $= \frac{1}{2}(a + b)h$



Volume of prism = (area of cross-section) × length

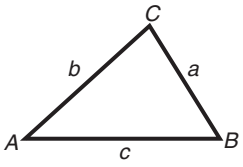


In any triangle *ABC*

Sine rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

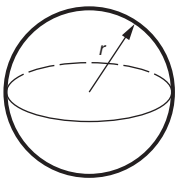
Cosine rule $a^2 = b^2 + c^2 - 2bc\cos A$

Area of triangle $= \frac{1}{2}ab\sin C$



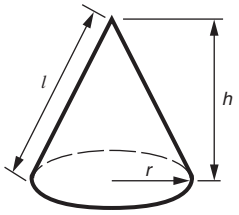
Volume of sphere $= \frac{4}{3}\pi r^3$

Surface area of sphere $= 4\pi r^2$



Volume of cone $= \frac{1}{3}\pi r^2 h$

Curved surface area of cone $= \pi rl$



The Quadratic Equation

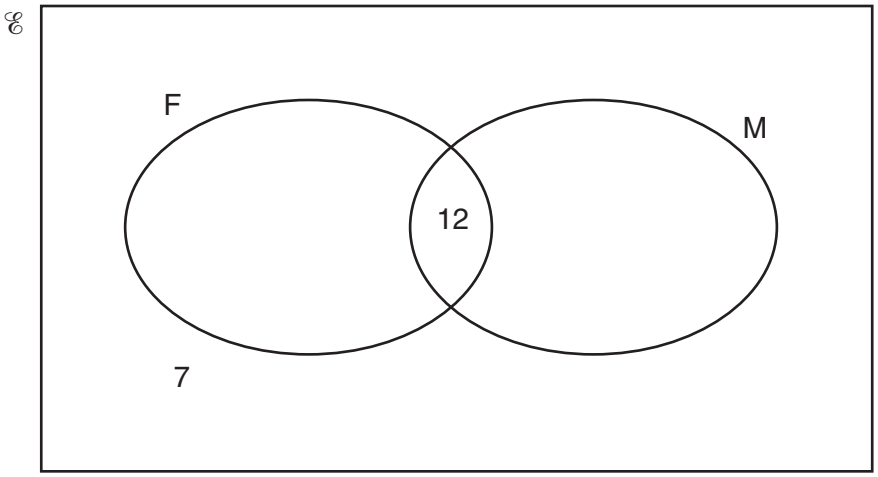
The solutions of $ax^2 + bx + c = 0$,
where $a \neq 0$, are given by

$$x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$$

Answer **all** the questions.

1 $\mathscr{E}$ = {integers from 2 to 12}
F = {factors of 24}
M = {multiples of 3}

(a) Complete this Venn diagram to show the sets $\mathscr{E}$, F and M.



[2]

(b) List the members of:

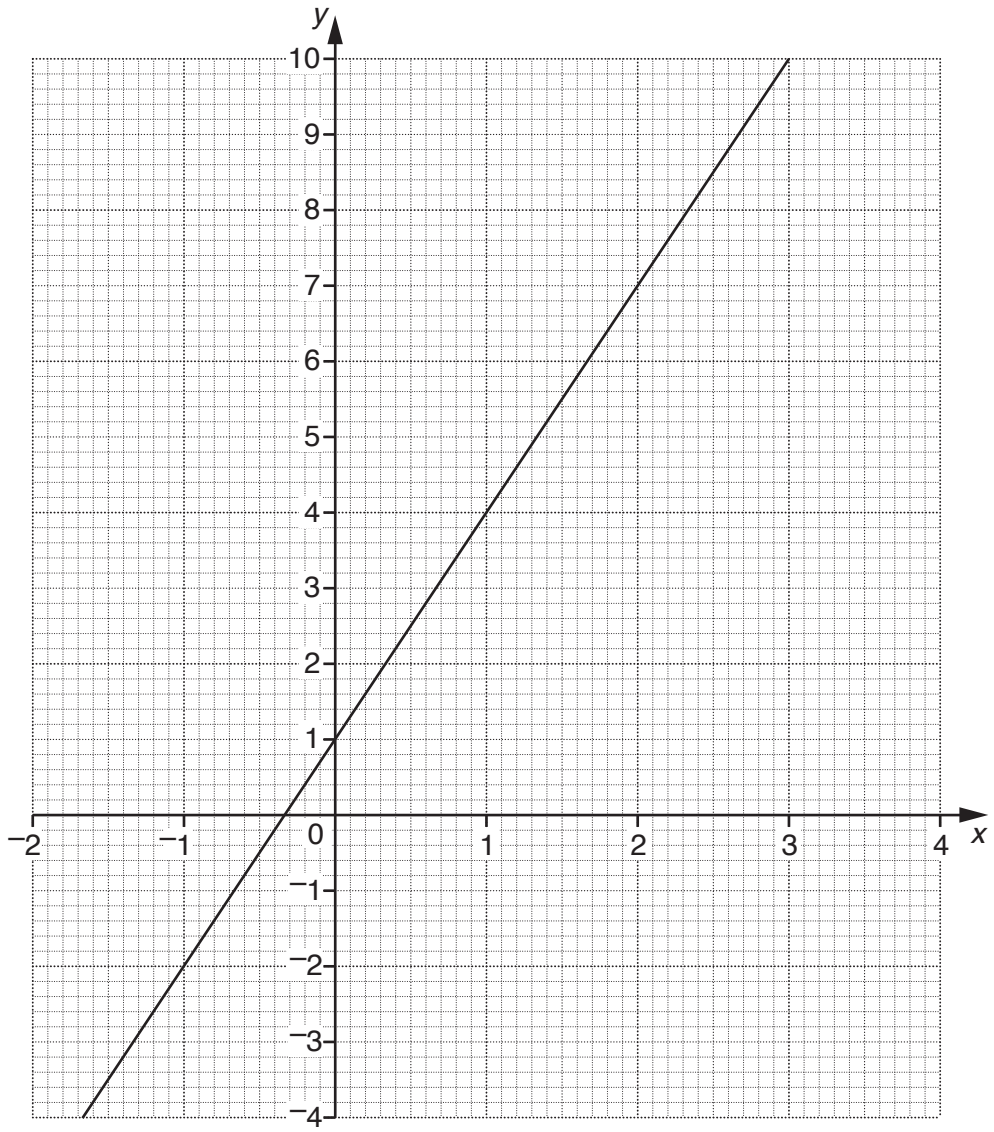
(i) $F \cap M$

(b)(i) ..... **[1]**

(ii) M'.

(ii) ..... **[1]**

2 The graph of $y = 3x + 1$ is drawn on the grid.



(a) Complete the table for $y = 5 - 2x$.

x	-2	0	2	4
$y = 5 - 2x$				

[2]

(b) Draw the graph of $y = 5 - 2x$. **[2]**

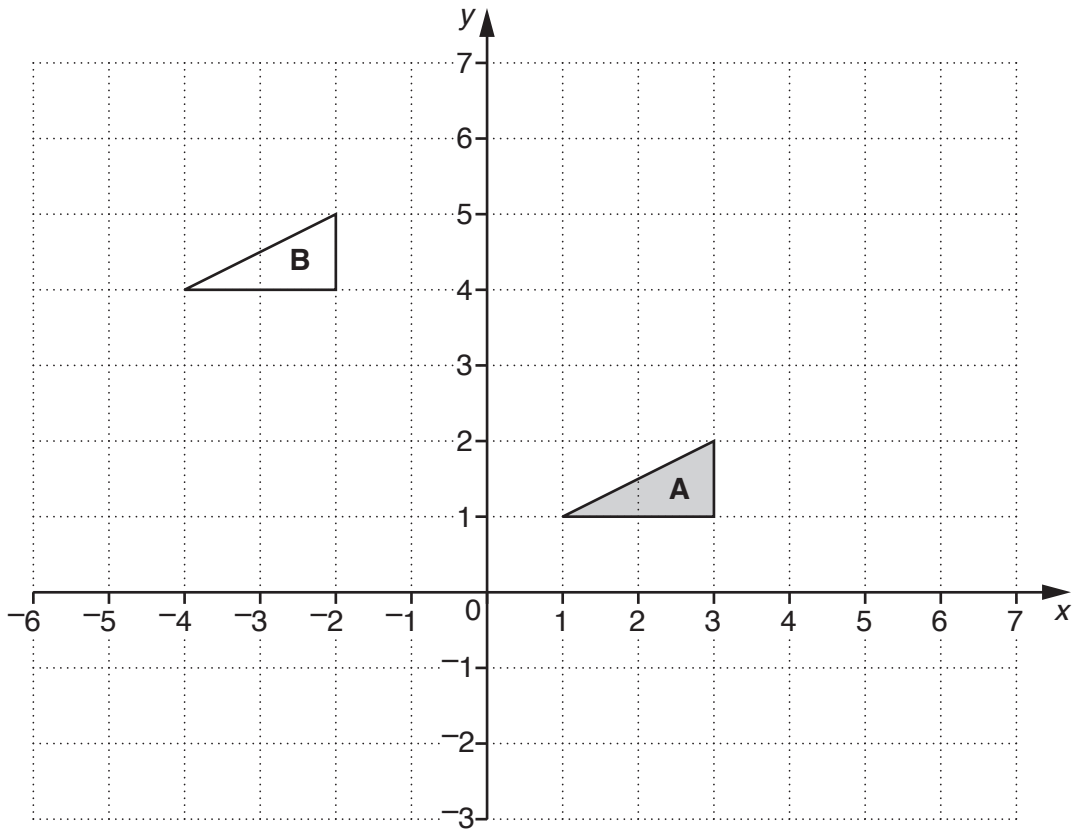
(c) What is the x-coordinate of the point where the two graphs cross?

(c) ..... **[1]**

(d) Find the gradient of the line $y = 5 - 2x$.

(d) ..... **[1]**

3



(a) Rotate triangle **A** through 90° anticlockwise about the point $(5, 2)$. **[2]**

(b) Describe fully the **single** transformation that maps triangle **A** onto triangle **B**.

.....

..... **[2]**

4* Solve.

$$7(x+2)-3x=2(x-5)$$

..... **[4]**

5 Complete the statements below using answers from this list.

an equation	a formula	an expression	none of these

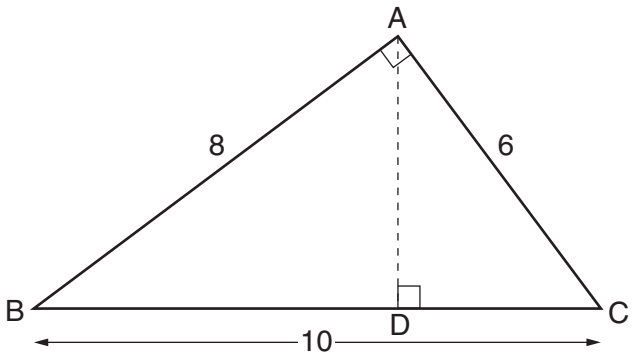
$A=2\pi rh+2\pi r^2$ is .....

$5x+3=2x-7$ is .....

$3y^2+5y-8$ is .....

$y^2=16$ is ..... **[3]**

6 In the diagram AB = 8 cm, AC = 6 cm and BC = 10 cm.
Angle BAC = angle ADC = 90°.

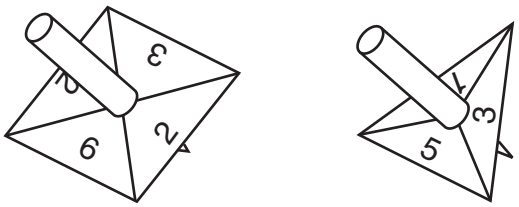


Not to scale

Find the length of AD.

..... cm **[3]**

7 Dipak spins each of these fair spinners once.



(a) Dipak makes a table to show all the different pairs of numbers he could get.
His score is the sum of the two numbers.

Number on 1st spinner	Number on 2nd spinner	Score
2	1	3
2	3	5

(i) Complete the table. **[2]**

(ii) Dipak says, "The probability of getting a total score of 5 is $\frac{1}{9}$".

Explain why Dipak is wrong.

..... **[1]**

(b) Find the probability that Dipak's score is 3.

(b) ..... **[2]**

8 Each day Jennie drinks $\frac{2}{5}$ of a carton of cranberry juice and her brother William drinks $\frac{1}{3}$ of a carton of cranberry juice.

How many days will 22 cartons of cranberry juice last them?

..... days **[4]**

9 **(a)** Which of these fractions have decimal equivalents which recur?
Put a tick (✓) under the ones which do recur and a cross (✗) under those which do not recur.

$\frac{3}{5}$	$\frac{5}{6}$	$\frac{17}{40}$	$\frac{5}{16}$	$\frac{5}{14}$	
.....	.....	.....	.....	.....	**[2]**

(b) Write these decimals as fractions in their simplest form.

(i) 0.15

(b)(i) ..... **[2]**

(ii) $0.\dot{3}$

(ii) ..... **[1]**

10 Find the value of x in each of these cases.

(a) $10^x = 10000$

(a) ..... **[1]**

(b) $2^5 \times 2^x = 2^{15}$

(b) ..... **[1]**

(c) $(3^x)^5 \div 3^3 = 3^{x+7}$

(c) ..... **[3]**

11 **(a)** Write 45 as the product of its prime factors.

(a) ..... **[1]**

(b) Greenford Gala is held once every 20 years.
Bailey's Fair is held once every 45 years.

They were last held in the same year in 2012.
In what year will they next both be held in the same year?

(b) ..... **[3]**

12 The 30 students on a school activities trip were offered the choice of sailing or rock climbing. The choices that the boys and girls made are shown in the table.

	Sailing	**Rock climbing**	**Total**
Boys	6		18
Girls			
Total	14		30

(a) Complete the table. **[2]**

(b) Two of the 30 students are selected at random.

What is the probability that they both chose sailing?

(b) ..... **[2]**

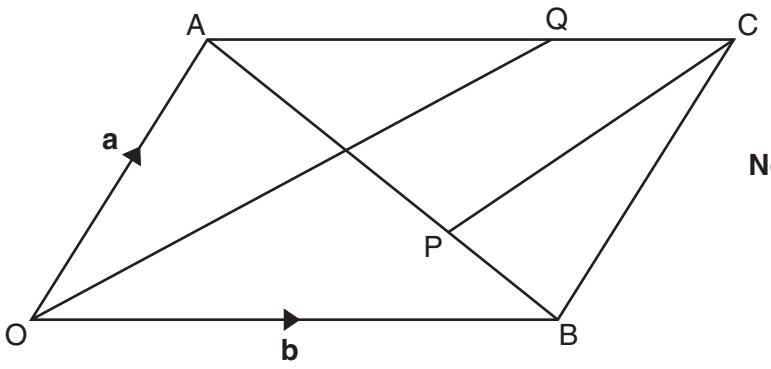
(c) Two of the students who chose rock climbing are selected at random.

What is the probability that one is a boy and one is a girl?

(c) ..... **[3]**

TURN OVER FOR QUESTION 13

13



Not to scale

OACB is a parallelogram.

$\overrightarrow{OA} = \mathbf{a}$ and $\overrightarrow{OB} = \mathbf{b}$.

$\overrightarrow{AQ} = \frac{2}{3}\overrightarrow{AC}$ and $\overrightarrow{AP} = \frac{3}{5}\overrightarrow{AB}$.

(a) Find these vectors in terms of **a** and **b**.
Give your answers in their simplest form.

(i) $\overrightarrow{OQ}$

(a)(i) ..... **[1]**

(ii) $\overrightarrow{PB}$

(ii) ..... **[2]**

(iii) $\overrightarrow{PC}$

(iii) ..... **[2]**

(b) Use answers from part **(a)** to explain why OQ is parallel to PC.

.....

..... **[1]**

END OF QUESTION PAPER